



Boot over IB (BoIB) User's Manual

Rev 1.0

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Boot over IB (BoIB) User's Manual

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1 Boot over IB (BoIB)

1.1 Overview

This chapter describes “Mellanox Boot over IB” (BoIB), the software for Boot over Mellanox Technologies InfiniBand (IB) HCA devices. BoIB enables booting kernels or operating systems (OS) from remote servers in compliance with the PXE specification.

BoIB is based on the open source project Etherboot/gPXE available at <http://www.etherboot.org>.

Etherboot/gPXE first initializes the HCA device. Then, it connects to a DHCP server to obtain its assigned IP address and network parameters, and also to obtain the source location of the kernel/OS to boot from. The DHCP server instructs Etherboot/gPXE to access the kernel/OS through a TFTP server, an iSCSI target, or other media.

Mellanox Boot over IB implements a network driver with IP over IB acting as the transport layer. IP over IB is part of the *Mellanox OFED for Linux* software package (see www.mellanox.com).

The binary code is exported by the device as an expansion ROM image.

1.2 Supported Mellanox HCA Devices

- ConnectX(TM) IB (Firmware: fw-25408)
- InfiniHost(TM) III Ex (Firmware: fw-25218)
- InfiniHost(TM) III Lx (Firmware: fw-25204)

1.3 Tested Platforms

See the Boot over IB Release Notes (`boot_over_ib_release_notes.txt`).

1.4 BoIB Package

The Boot over IB package is provided as a tarball (.gz extension). Uncompress it using the command “`tar xzf <package file name>`”. The tarball contains the following files:

1. PXE binary files for Mellanox HCA devices

- HCA: ConnectX IB SDR (PCI DevID: 25408)
 - CONNECTX_SDR_PORT1_ROM-1.0.0.rom (IB Port 1)
 - CONNECTX_SDR_PORT2_ROM-1.0.0.rom (IB Port 2)
- HCA: ConnectX IB DDR (PCI DevID: 25418)
 - CONNECTX_DDR_PORT1_ROM-1.0.0.rom (IB Port 1)
 - CONNECTX_DDR_PORT2_ROM-1.0.0.rom (IB Port 2)
- HCA: InfiniHost III Ex in Mem-Free mode (PCI DevID: 25218)

- IHOST3EX_PORT1_ROM-1.0.0.rom (IB Port 1)
 - IHOST3EX_PORT2_ROM-1.0.0.rom (IB Port 2)
 - HCA: InfiniHost III Lx (PCI DevID: 25204)
 - IHOST3LX_ROM-1.0.0.rom (single IB Port device)
2. A docs/ directory includes the following files:
- Boot-over-IB_User_Manual_1_0.pdf – this user’s manual
 - boot_over_ib_release_notes.txt – release notes
 - dhcpd.conf – sample DHCP configuration file
 - dhcp.patch – patch file for DHCP v3.1.1rc1

1.5 Burning the Expansion ROM Image

Note: You need to install the Mellanox Firmware Tools (MFT) package (version 2.1.0 or later) in order to burn the expansion ROM image.

The binary code resides in the same Flash device of the device firmware. Note that the binary files are distinct and do not affect each other. Mellanox’s `mlxburn` tool (part of the MFT package) is available for burning, however it is not possible to burn the expansion ROM image by itself. Rather, both the firmware and expansion ROM images must be burnt simultaneously.

`mlxburn` requires the following items:

1. MST device name. To obtain it, run:

```
mst start
mst status
```

The device name will be of the form: `/dev/mst/mt<dev_id>_pci{ _cr0 | conf0 }`.

2. The firmware `mlx` file `fw-25418-X_X_XXX.mlx`
3. One of the expansion ROM binary files listed in [Section 1.4](#).

Firmware Burning Example

The following command burns a firmware image and an expansion ROM image to the Flash device of a ConnectX IB HCA Card:

```
mlxburn -dev /dev/mst/mt25418_pci_cr0 -fw fw-25418-X_X_XXX.mlx -exp_rom \
CONNECTX_DDR_PORT1_ROM-RC1.rom
```

Firmware Update Example

To update the expansion ROM image, enter:

```
mlxburn -dev /dev/mst/mt25418_pci_cr0 -fw fw-25418-X_X_XXX.mlx -exp_rom AUTO
```

1.6 Preparing the DHCP Server

The DHCP server plays a major role in the boot process by assigning IP addresses for BoIB clients and instructing the clients where to boot from. BoIB requires that the DHCP server runs on a machine which supports IP over IB.

1.6.1 Installing DHCP

Note: Prior to installing DHCP, make sure that *Mellanox OFED for Linux* is already installed on your DHCP server – see www.mellanox.com.

Download and install DHCP v3.1.1rc1 from www.isc.org. A special patch for DHCP is required for supporting IPoIB. The patch file “dhcp.patch” is available under the docs/ directory.

Standard DHCP fields holding MAC addresses are not large enough to contain an IPoIB hardware address. To overcome this problem, DHCP over InfiniBand messages convey a client identifier field used to identify the DHCP session. This client identifier field can be used to associate an IP address with a client identifier value, such that the DHCP server will grant the same IP address to any client that conveys this client identifier.

Note: Refer to the DHCP documentation for more details how to make this association.

1.6.2 Configuring the DHCP Server

When a BoIB client boots, it sends the DHCP server various information, including its DHCP client identifier. This identifier is used to distinguish between the various DHCP sessions.

The value of the client identifier is composed of 21 bytes (separated by colons) having the following components:

```
20:<QP Number - 4 bytes>:<GID - 16 bytes>
```

Note: Bytes are represented as two-hexadecimal digits.

Extracting the Client Identifier – Method I

The following steps describe one method for extracting the client identifier:

- Step 1.** QP Number equals 00:55:04:01 for InfiniHost III Ex and InfiniHost III Lx HCAs, and 00:55:00:41 for ConnectX IB HCAs.
- Step 2.** GID is composed of an 8-byte subnet prefix and an 8-byte Port GUID. The subnet prefix is fixed for the supported Mellanox HCAs, and is equal to fe:80:00:00:00:00:00:00. The next steps explain how to obtain the Port GUID.
- Step 3.** To obtain the Port GUID, run the following commands:

Note: The following MFT commands assume that the Mellanox Firmware Tools (MFT) package has been installed on the client machine.

```
host1# mst start
host1# mst status
```

The device name will be of the form: /dev/mst/mt<dev_id>_pci{ _cr0|conf0}. Use this device name to obtain the Port GUID via a query command.

```
flint -d <MST_DEVICE_NAME> q
```

Example with InfiniHost III Ex as the HCA device:

```
host1# flint -d /dev/mst/mt25218_pci_cr0 q
Image type:      Failsafe
```

```

FW Version:      5.3.0
Rom Info:        type=GPXE version=1.0.0 devid=25218 port=2
I.S. Version:    1
Device ID:       25218
Chip Revision:   A0
Description:     Node          Port1          Port2          Sys image
GUIDs:          0002c90200231390 0002c90200231391 0002c90200231392 0002c90200231393
Board ID:        (MT_0370110001)
VSD:
PSID:            MT_0370110001

```

Assuming that BoIB is connected via Port 2, then the Port GUID is 00:02:c9:02:00:23:13:92.

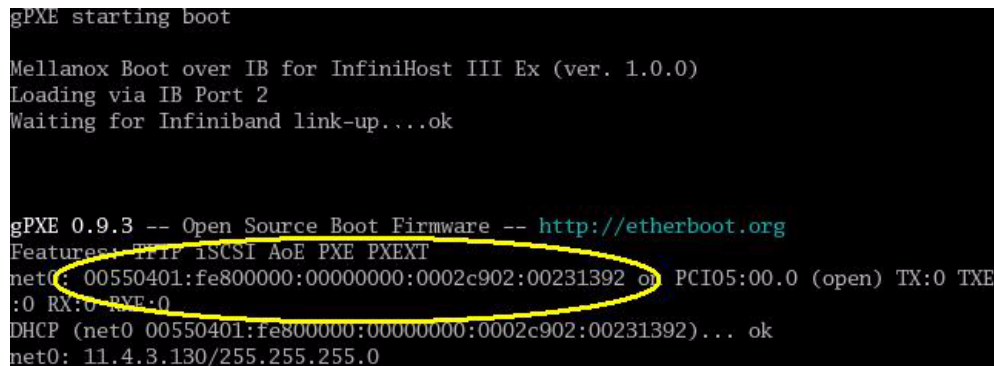
Step 4. The resulting client identifier is the concatenation, from left to right, of 20, the QP_Number, the subnet prefix, and the Port GUID.

In the example above this yields the following DHCP client identifier:

```
20:00:55:04:01:fe:80:00:00:00:00:00:00:00:02:c9:02:00:23:13:92
```

Extracting the Client Identifier – Method II

An alternative method for obtaining the 20 bytes of QP Number and GUID involves booting the client machine via BoIB. This requires having a Subnet Manager running on one of the machines in the InfiniBand subnet. The 20 bytes can be captured from the boot session as shown in the figure below.



```

gPXE starting boot
Mellanox Boot over IB for InfiniHost III Ex (ver. 1.0.0)
Loading via IB Port 2
Waiting for Infiniband link-up...ok

gPXE 0.9.3 -- Open Source Boot Firmware -- http://etherboot.org
Features: TRIP iSCSI AoE PXE PXEXT
net0: 00550401:fe800000:00000000:0002c902:00231392 on PCI05:00.0 (open) TX:0 TXE:0 RX:0 RXT:0
DHCP (net0 00550401:fe800000:00000000:0002c902:00231392)... ok
net0: 11.4.3.130/255.255.255.0

```

Concatenate the byte '20' to the left of the captured 20 bytes, then separate every byte (two hexadecimal digits) with a colon. You should obtain the same result shown in [Step 4](#) above.

Placing Client Identifiers in /etc/dhcpd.conf

The following is an excerpt of a /etc/dhcpd.conf example file showing the format of representing a client machine for the DHCP server.

```

host host1 {
    next-server 11.4.3.7;
    filename "pxelinux.0";
    fixed-address 11.4.3.130;
    option dhcp-client-identifier = \
    20:00:55:04:01:fe:80:00:00:00:00:00:00:00:02:c9:02:00:23:13:92;
}

```

1.6.3 Running the DHCP Server

In order for the DHCP server to provide configuration records for clients, an appropriate configuration file, `dhcpd.conf`, must be created and put under `/etc`. See an example under `docs/` of the *Mellanox OFED for Linux* installation.

The DHCP server must run on a machine which has loaded the IPoIB module.

To run the DHCP server from the command line, enter:

```
dhcpd <IB network interface name> -d
```

Example:

```
host1# dhcpd ib0 -d
```

1.6.4 Running the DHCP Client (Optional)

Note: A DHCP client can be used if you need to prepare a diskless machine with an IB driver. See [Step 8](#) under [“Example: Adding an IB Driver to initrd”](#).

In order to use a DHCP client identifier, you need to first create a configuration file that defines the DHCP client identifier. Then run the DHCP client with this file using the following command:

```
dhclient -cf <client conf file> <IB network interface name>
```

Example:

The following configuration file defines a DHCP client identifier that has the format that Boot over IB uses.

dhclient.conf:

```
# The value indicates a hexadecimal number
interface "ib1" {
send dhcp-client-identifier 20:00:55:04:01:fe:80:00:00:00:00:00:00:02:c9:02:00:23:13:92;
}
```

In order to use the configuration file, run:

```
host1# dhclient -cf dhclient.conf ib1
```

1.7 Subnet Manager – OpenSM

BoIB requires a Subnet Manager to be running on one of the machines in the IB network. OpenSM is part of the *Mellanox OFED for Linux* software package and can be used to accomplish this. Note that OpenSM may be run on the same host running the DHCP server but it is not mandatory.

1.8 TFTP Server

When you set the 'filename' parameter in your DHCP configuration file to a non-empty filename, the client will ask for this file to be passed through TFTP. For this reason you need to install a TFTP server.

1.9 BIOS Configuration

The expansion ROM image presents itself to the BIOS as a boot device. As a result, the BIOS will add 'gPXE' to the list of boot devices. The priority of this list can be modified through BIOS setup.

1.10 Operation

1.10.1 Prerequisites

- Make sure that your client is connected to the server(s)
- Burn your client machine with BoIB as described in [Section 1.5](#)
- Start the Subnet Manager as described in [Section 1.7](#)
- Configure and start the DHCP server as described in [Section 1.6](#)
- Configure and start at least one of the services iSCSI Target (see [Section 1.12](#)) and/or TFTP (see [Section 1.8](#))

1.10.2 Starting Boot

Boot the client machine and enter BIOS setup to configure gPXE to be the first on the boot device priority list – see [Section 1.9](#).

If gPXE was selected through BIOS setup, the client will boot from BoIB. The client will display BoIB attributes and wait for IB port configuration by the subnet manager.

```
gPXE starting boot
Mellanox Boot over IB for InfiniHost III Ex (ver. 1.0.0)
Loading via IB Port 2
Waiting for Infiniband link-up...ok
```

After configuring the IB port, the client attempts connecting to the DHCP server to obtain the source location of the kernel/OS to boot from.

```
gPXE 0.9.3 -- Open Source Boot Firmware -- http://etherboot.org
Features: TFTP iSCSI AoE PXE PXEXT
net0: 00550401:fe800000:00000000:0002c902:00231392 on PCI05:00.0 (ope
:0 RX:0 RXE:0
DHCP (net0 00550401:fe800000:00000000:0002c902:00231392)... ok
net0: 11.4.3.130/255.255.255.0
```

1.11 Diskless Machines

Mellanox Boot over IB supports booting diskless machines. To enable using an IB driver, the (remote) kernel or `initrd` image must include and be configured to load the IB driver, including IPoIB.

This can be achieved either by compiling the HCA driver into the kernel, or by adding the device driver module into the `initrd` image and loading it.

The IB driver requires loading the following modules in the specified order (see [Section 1.11.1](#) for an example):

- `ib_addr.ko`
- `ib_core.ko`
- `ib_mad.ko`
- `ib_sa.ko`
- `ib_cm.ko`
- `ib_uverbs.ko`
- `ib_ucm.ko`
- `ib_umad.ko`
- `iw_cm.ko`
- `rdma_cm.ko`
- `rdma_ucm.ko`
- `mlx4_core.ko`
- `mlx4_ib.ko`
- `ib_mthca.ko`
- `ib_ipoib.ko`

1.11.1 Example: Adding an IB Driver to `initrd`

Prerequisites

1. The BoIB image is already programmed on the HCA card.
2. The DHCP server is installed and configured as described in Section 1.6.2, “Configuring the DHCP Server”, and connected to the client machine.
3. An `initrd` file.
4. To add an IB driver into `initrd`, you need to copy the IB modules to the diskless image. Your machine needs to be pre-installed with a *Mellanox OFED for Linux* ISO image (available for download from www.mellanox.com) that is appropriate for the kernel version the diskless image will run.

Note: The remainder of this section assumes that Mellanox OFED has been installed on your machine.

Adding the IB Driver to the `initrd` File

Warning! The following procedure modifies critical files used in the boot procedure. It must be executed by users with expertise in the boot process. Improper application of this procedure may prevent the diskless machine from booting.

Step 1. Back up your current `initrd` file.

Step 2. Make a new working directory and change to it.

```
host1$ mkdir /tmp/initrd_ib
host1$ cd /tmp/initrd_ib
```

Step 3. Normally, the `initrd` image is zipped. Extract it using the following command:

```
host1$ gzip -dc <initrd image> | cpio -id
```

The initrd files should now be found under /tmp/initrd_ib

Step 4. Create a directory for the InfiniBand modules and copy them.

```
host1$ mkdir -p /tmp/initrd_ib/lib/modules/ib
host1$ cd /lib/modules/`uname -r`/updates/kernel/drivers
host1$cp infiniband/core/ib_addr.ko /tmp/initrd_ib/lib/modules/ib
host1$cp infiniband/core/ib_core.ko /tmp/initrd_ib/lib/modules/ib
host1$cp infiniband/core/ib_mad.ko /tmp/initrd_ib/lib/modules/ib
host1$cp infiniband/core/ib_sa.ko /tmp/initrd_ib/lib/modules/ib
host1$cp infiniband/core/ib_cm.ko /tmp/initrd_ib/lib/modules/ib
host1$cp infiniband/core/ib_uverbs.ko /tmp/initrd_ib/lib/modules/ib
host1$cp infiniband/core/ib_ucm.ko /tmp/initrd_ib/lib/modules/ib
host1$cp infiniband/core/ib_umad.ko /tmp/initrd_ib/lib/modules/ib
host1$cp infiniband/core/iw_cm.ko /tmp/initrd_ib/lib/modules/ib
host1$cp infiniband/core/rdma_cm.ko /tmp/initrd_ib/lib/modules/ib
host1$cp infiniband/core/rdma_ucm.ko /tmp/initrd_ib/lib/modules/ib
host1$cp net/mlx4/mlx4_core.ko /tmp/initrd_ib/lib/modules/ib
host1$cp infiniband/hw/mlx4/mlx4_ib.ko /tmp/initrd_ib/lib/modules/ib
host1$cp infiniband/hw/mthca/ib_mthca.ko /tmp/initrd_ib/lib/modules/ib
host1$cp infiniband/ulp/ipoib/ib_ipoib.ko /tmp/initrd_ib/lib/modules/ib
```

Step 5. IB requires loading an IPv6 module. If you do not have it in your initrd, please add it using the following command:

```
host1$ cp /lib/modules/`uname -r`/kernel/net/ipv6/ipv6.ko \
/tmp/initrd_ib/lib/modules
```

Step 6. To load the modules, you need the insmod executable. If you do not have it in your initrd, please add it using the following command:

```
host1$ cp /sbin/insmod /tmp/initrd_ib/sbin/
```

Step 7. If you plan to give your IB device a static IP address, then copy ifconfig. Otherwise, skip this step.

```
host1$ cp /sbin/ifconfig /tmp/initrd_ib/sbin
```

Step 8. If you plan to obtain an IP address for the IB device through DHCP, then you need to copy the DHCP client which was compiled specifically to support IB; Otherwise, skip this step.

To continue with this step, DHCP client v3.1.1rc1 needs to be already installed on the machine you are working with.

Copy the DHCP client file and all the relevant files as described below.

```
host1# cp /sbin/dhclient /tmp/initrd_ib/sbin
host1# mkdir -p /tmp/initrd_ib/var/state/dhcp
host1# touch /tmp/initrd_ib/var/state/dhcp/dhclient.leases
host1# cp /sbin/dhclient-script /tmp/initrd_ib/sbin
host1# cp /bin/uname /tmp/initrd_ib/bin
```

```
host1# cp /usr/bin/expr /tmp/initrd_ib/bin
host1# cp /sbin/ifconfig /tmp/initrd_ib/bin
host1# cp /bin/hostname /tmp/initrd_ib/bin
```

Create a configuration file for the DHCP client (as described in [Section 1.6.4](#)) and place it under `/tmp/initrd_ib/sbin`. The following is an example of such a file (called `dhclient.conf`):

dhclient.conf:

```
# The value indicates a hexadecimal number
interface "ib1" {
    send dhcp-client-identifier \
    20:00:55:04:01:fe:80:00:00:00:00:00:00:02:c9:02:00:23:13:92;
}
```

Step 9. Now you can add the commands for loading the copied modules into the file `init`. Edit the file `/tmp/initrd_ib/init` and add the following lines at the point you wish the IB driver to be loaded.

Warning! The order of the following commands (for loading modules) is critical.

```
echo "loading ipv6"
/sbin/insmod /lib/modules/ipv6.ko
echo "loading IB driver"
/sbin/insmod /lib/modules/ib/ib_addr.ko
/sbin/insmod /lib/modules/ib/ib_core.ko
/sbin/insmod /lib/modules/ib/ib_mad.ko
/sbin/insmod /lib/modules/ib/ib_sa.ko
/sbin/insmod /lib/modules/ib/ib_cm.ko
/sbin/insmod /lib/modules/ib/ib_uverbs.ko
/sbin/insmod /lib/modules/ib/ib_ucm.ko
/sbin/insmod /lib/modules/ib/ib_umad.ko
/sbin/insmod /lib/modules/ib/iw_cm.ko
/sbin/insmod /lib/modules/ib/rdma_cm.ko
/sbin/insmod /lib/modules/ib/rdma_ucm.ko
/sbin/insmod /lib/modules/ib/mlx4_core.ko
/sbin/insmod /lib/modules/ib/mlx4_ib.ko
/sbin/insmod /lib/modules/ib/ib_mthca.ko
/sbin/insmod /lib/modules/ib/ib_ipoib.ko
```

Step 10. Now you can assign an IP address to your IB device by adding a call to `ifconfig` or to the DHCP client in the `init` file after loading the modules. If you wish to use the DHCP client, then you need to add a call to the DHCP client in the `init` file after loading the IB modules. For example:

```
/sbin/dhclient -cf /sbin/dhclient.conf ib1
```

Step 11. Save the `init` file.

Step 12. Close `initrd`.

```
host1$ cd /tmp/initrd_ib
host1$ find ./ | cpio -H newc -o > /tmp/new_initrd_ib.img
host1$ gzip /tmp/new_init_ib.img
```

Step 13. At this stage, the modified `initrd` (including the IB driver) is ready and located at `/tmp/new_init_ib.img.gz`. Copy it to the original `initrd` location and rename it properly.

1.12 iSCSI Boot

Mellanox Boot over IB enables an iSCSI-boot of an OS located on a remote iSCSI Target. It has a built-in iSCSI Initiator which can connect to the remote iSCSI Target and load from it the kernel and `initrd`. There are two instances of connection to the remote iSCSI Target: the first is for getting the kernel and `initrd` via BoIB, and the second is for loading other parts of the OS via `initrd`.

Note: Linux distributions such as SuSE Linux Enterprise Server 10 SP1 and Red Hat Enterprise Linux 5.1 can be directly installed on an iSCSI target. At the end of this direct installation, `initrd` is capable to continue loading other parts of the OS on the iSCSI target. (Other distributions may also be suitable for direct installation on iSCSI targets.)

If you choose to continue loading the OS (after boot) through the HCA device driver, please verify that the `initrd` image includes the HCA driver as described in [Section 1.11](#).

1.12.1 Configuring an iSCSI Target

Prerequisites

Step 1. Make sure that an iSCSI Target is installed on your server side.

Tip You can download and install an iSCSI Target from the following location:
http://sourceforge.net/project/showfiles.php?group_id=108475&package_id=117141

Step 2. Dedicate a partition on your iSCSI Target on which you will later install the operating system

Step 3. Configure your iSCSI Target to work with the partition you dedicated. If, for example, you choose partition `/dev/sda5`, then edit the iSCSI Target configuration file `/etc/ietd.conf` to include the following line under the iSCSI Target `iqn` line:

```
Lun 0 Path=/dev/sda5,Type=fileio
```

Tip The following is an example of an iSCSI Target `iqn` line:
 Target iqn.2007-08.7.3.4.10:iscsiboot

Step 4. Start your iSCSI Target.

Example:

```
host1# /etc/init.d/iscsitarget start
```

Configuring the DHCP Server to Boot From an iSCSI Target

Configure DHCP as described in Section 1.6.2, “Configuring the DHCP Server”.

Edit your DHCP configuration file (`/etc/dhcpd.conf`) and add the following lines for the machine(s) you wish to boot from the iSCSI Target:

```
Filename "";  
option root-path "iscsi:iscsi_target_ip:::iscsi_target_iqn";
```

The following is an example for configuring an IB device to boot from an iSCSI Target:

```
host host1{  
  filename "";  
  option dhcp-client-identifier = \  
fe:00:55:00:41:fe:80:00:00:00:00:00:00:00:02:c9:03:00:00:0d:41;  
  option root-path "iscsi:11.4.3.7:::iqn.2007-08.7.3.4.10:iscsiboot";  
}
```

1.12.2 iSCSI Boot Example of SLES 10 SP1 OS

This section provides an example of installing the SLES 10 SP1 operating system on an iSCSI target and booting from a diskless machine via BoIB. Note that the procedure described below assumes the following:

- The client's LAN card is recognized during installation
- The iSCSI target can be connected to the client via LAN and InfiniBand

Prerequisites

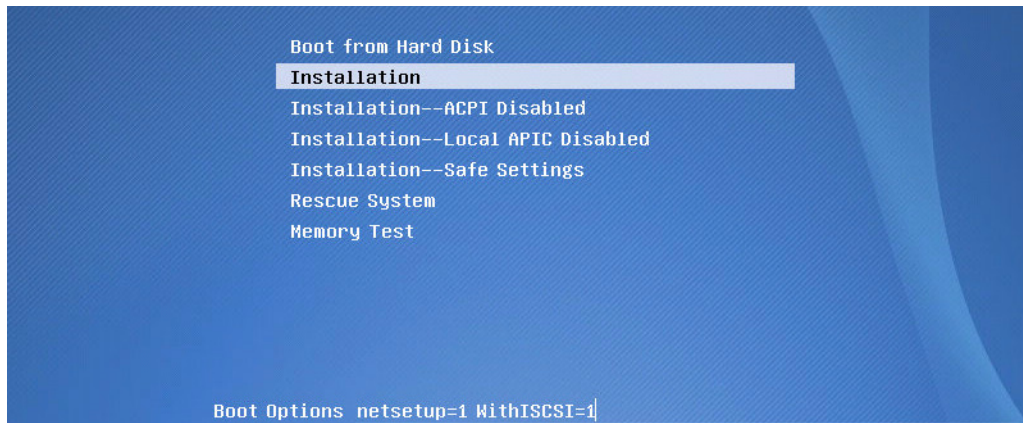
See [Section 1.10.1 on page 10](#).

Warning! The following procedure modifies critical files used in the boot procedure. It must be executed by users with expertise in the boot process. Improper application of this procedure may prevent the diskless machine from booting.

Procedure

Step 1. Load the SLES 10 SP1 installation disk and enter the following parameters as boot options:

```
netsetup=1 WithISCSI=1
```



Step 2. Continue with the procedure as instructed by the installation program until the “iSCSI Initiator Overview” window appears.



Step 3. Click the Add tab in the iSCSI Initiator Overview window. An iSCSI Initiator Discovery window will pop up. Enter the IP Address of your iSCSI target and click Next.

iSCSI Initiator Discovery

IP Address: Port:

☒ No Authentication

☐ Incoming Authentication

Username: Password:

☐ Outgoing Authentication

Username: Password:

Buttons: Help, Back, Abort, Next

Step 4. Details of the discovered iSCSI target(s) will be displayed in the iSCSI Initiator Discovery window. Select the target that you wish to connect to and click Connect.

iSCSI Initiator Discovery

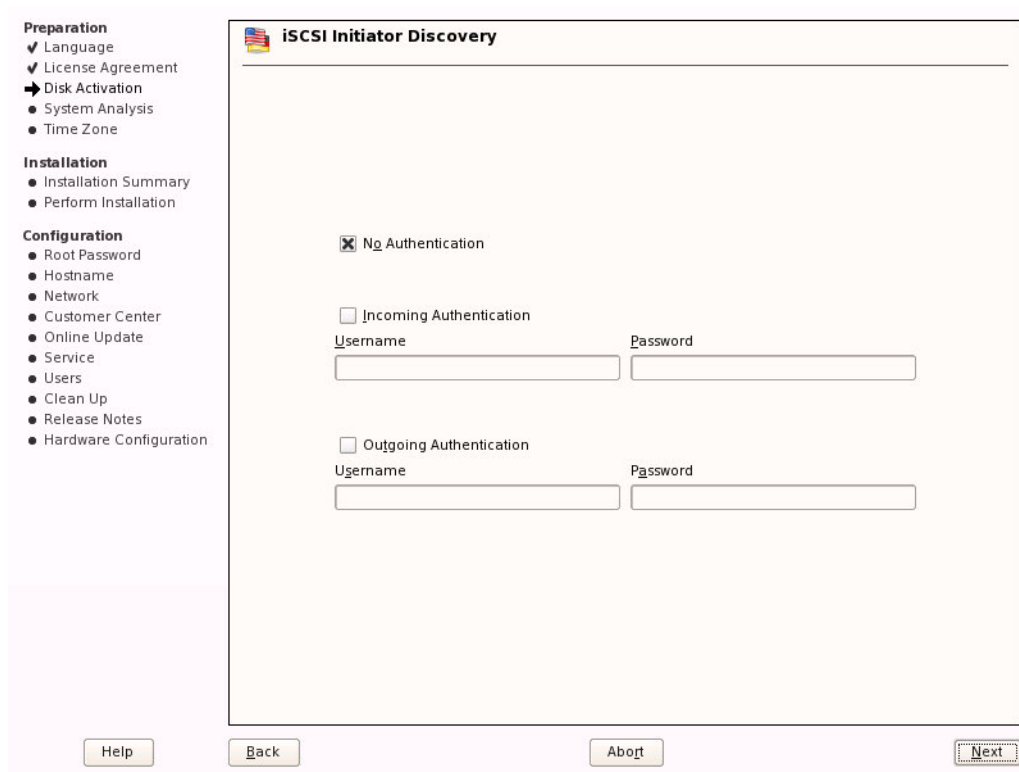
Portal Address	Target Name	Connected
10.4.3.7:3260.1	iqn.2007-08.7.3.4.10:iscsiboot	False

Connect

Tip

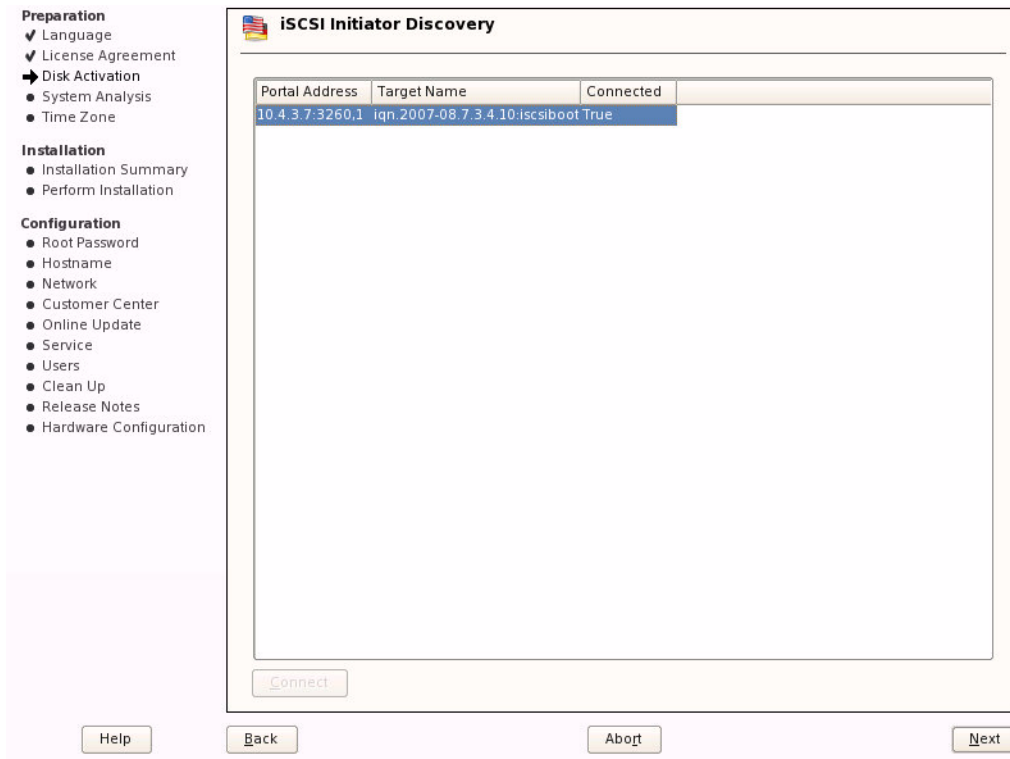
If no iSCSI target was recognized, then either the target was not properly installed or no connection was found between the client and the iSCSI target. Open a shell to ping the iSCSI target (you can use CTRL-ALT-F2) and verify that the target is or is not accessible. To return to the (graphical) installation screen, press CTRL-ALT-F7.

Step 5. The iSCSI Initiator Discovery window will now request authentication to access the iSCSI target. Click Next to continue without authentication unless authentication is required.

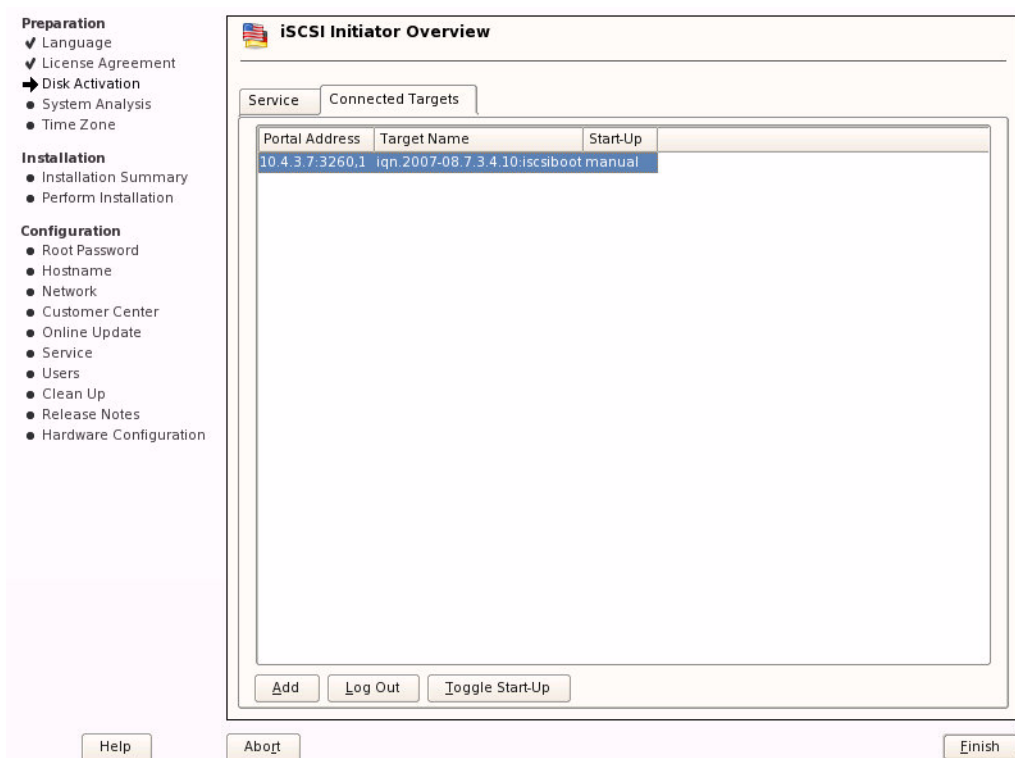


The image shows the 'iSCSI Initiator Discovery' window in a graphical user interface. On the left is a sidebar with a list of installation steps: Preparation (Language, License Agreement, Disk Activation, System Analysis, Time Zone), Installation (Installation Summary, Perform Installation), and Configuration (Root Password, Hostname, Network, Customer Center, Online Update, Service, Users, Clean Up, Release Notes, Hardware Configuration). The 'iSCSI Initiator Discovery' window itself has a title bar with a US flag icon. Inside, there are three sections: 'No Authentication' with a checked checkbox, 'Incoming Authentication' with an unchecked checkbox and fields for 'Username' and 'Password', and 'Outgoing Authentication' with an unchecked checkbox and fields for 'Username' and 'Password'. At the bottom of the window are four buttons: 'Help', 'Back', 'Abort', and 'Next'.

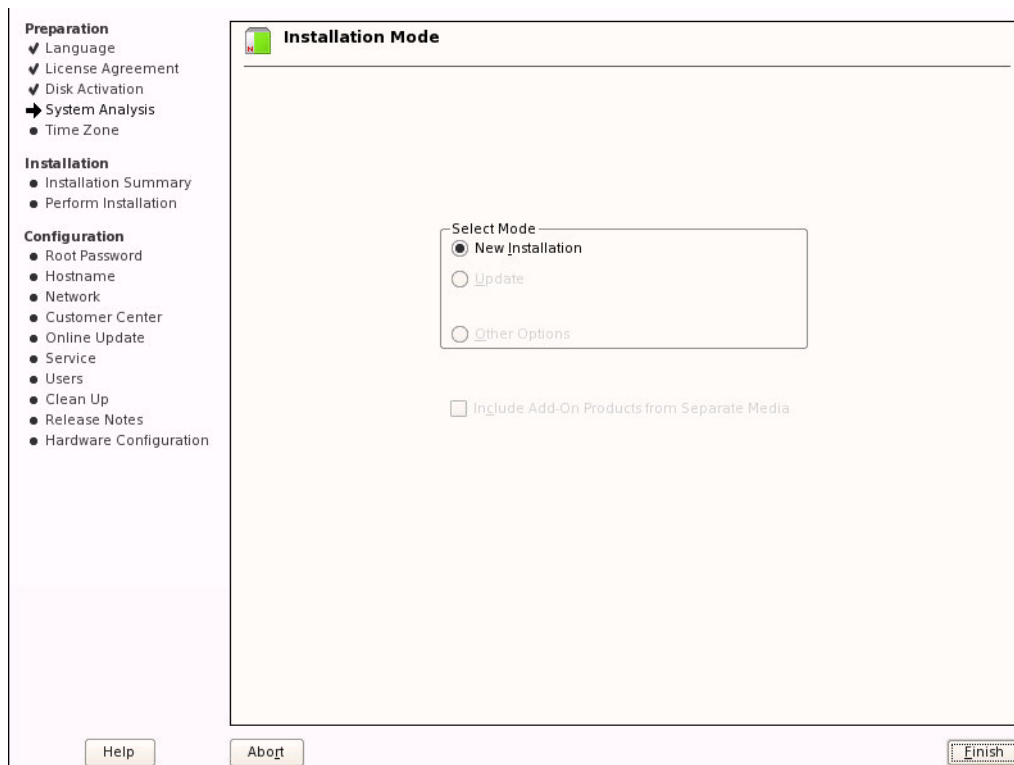
Step 6. The iSCSI Initiator Discovery window will show the iSCSI target that got connected to. Note that the Connected column must indicate True for this target. Click Next. (See figure below.)



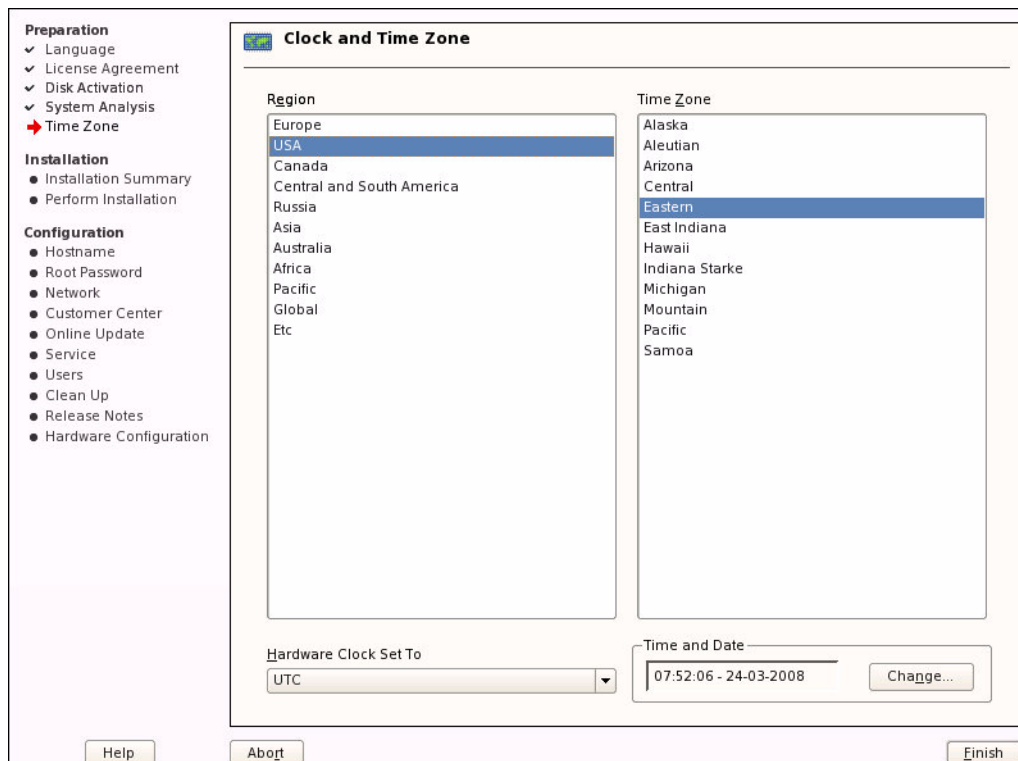
Step 7. The iSCSI Initiator Overview window will pop up. Click Toggle Start-Up to change start up from manual to automatic. Click Finish.



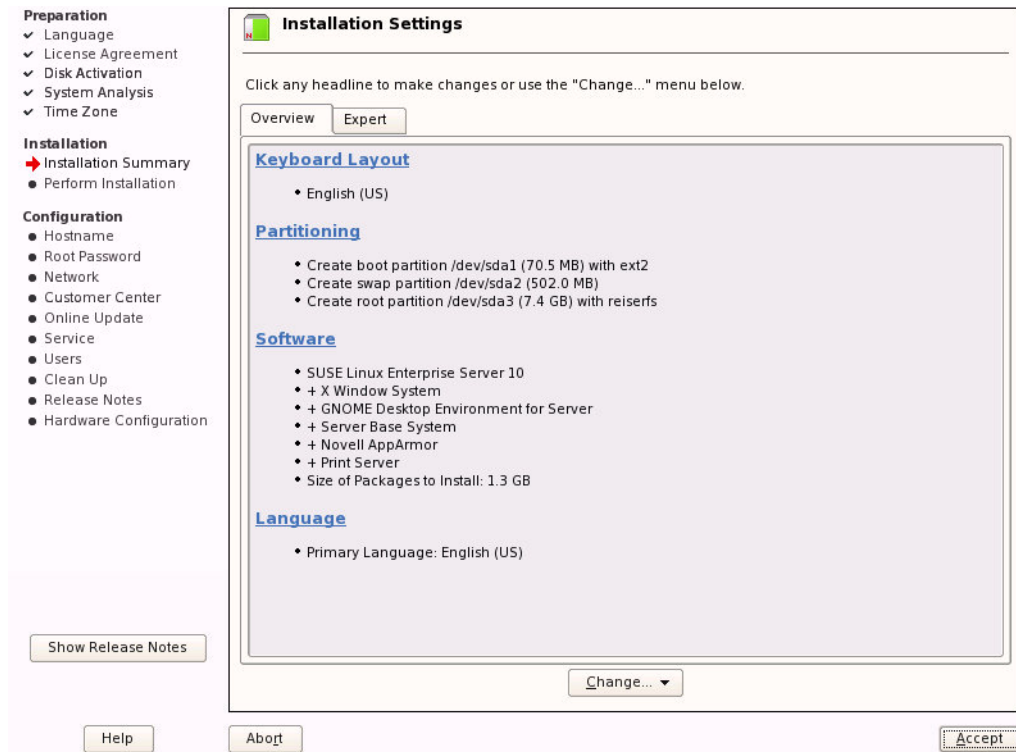
Step 8. Select New Installation then click Finish in the Installation Mode window.



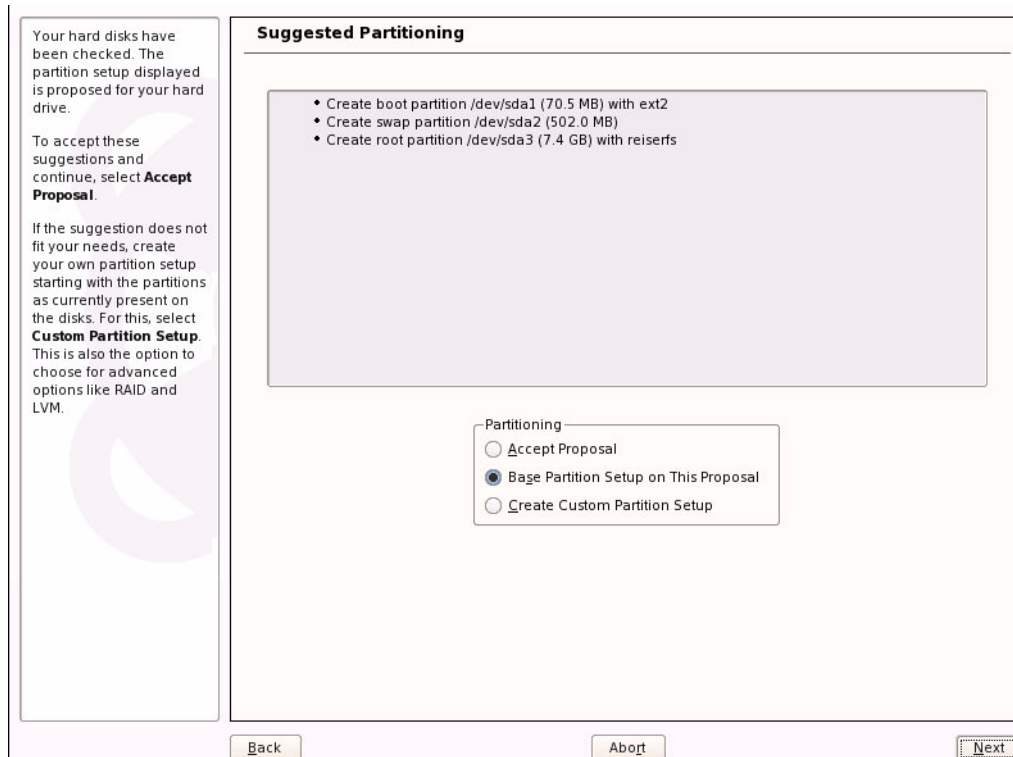
Step 9. Select the appropriate Region and Time Zone in the Clock and Time Zone window, then click Finish.



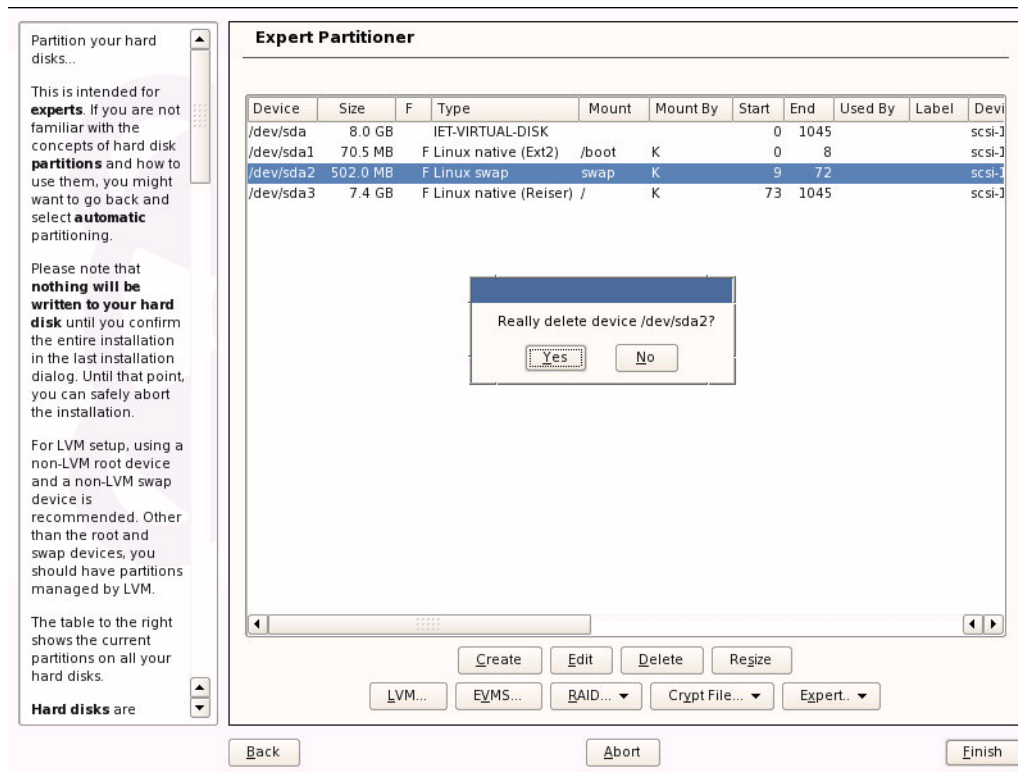
Step 10. In the Installation Settings window, click Partitioning to get the Suggested Partitioning window.



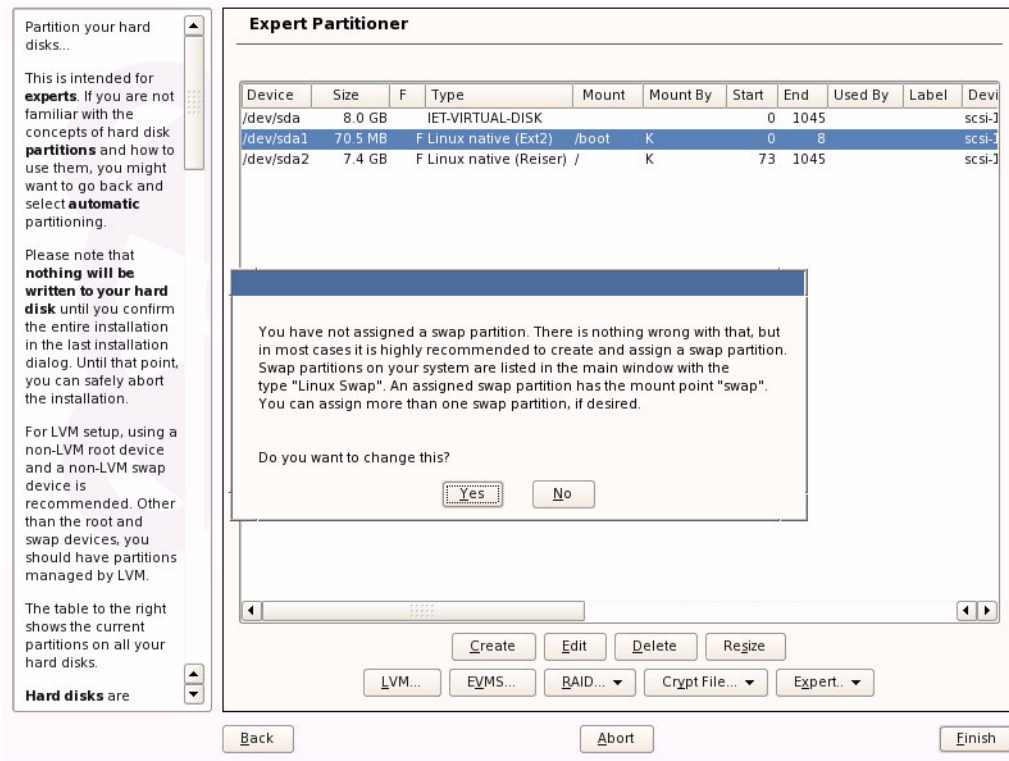
Step 11. Select Base Partition Setup on This Proposal then click Next.



Step 12. In the Expert Partitioner window, select from the IET-VIRTUAL-DISK device the row that has its Mount column indicating 'swap', then click Delete. Confirm the delete operation and click Finish.

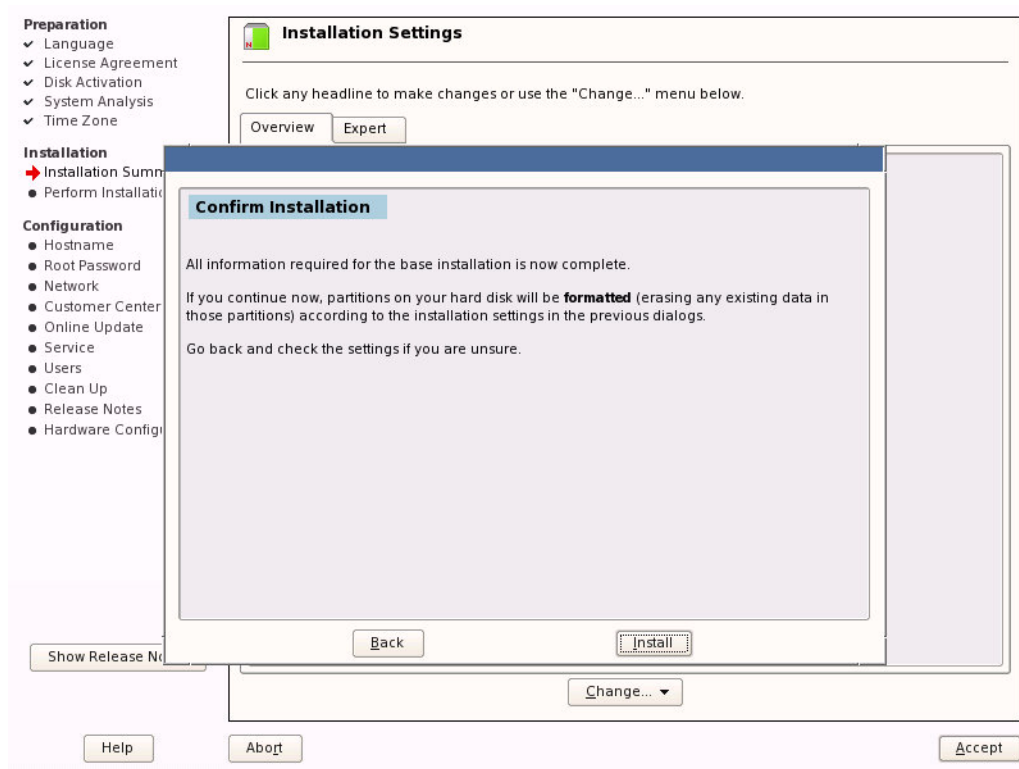


Step 13. In the pop-up window click No to approve deleting the swap partition. You will be returned to Installation Settings window. (See image below.)



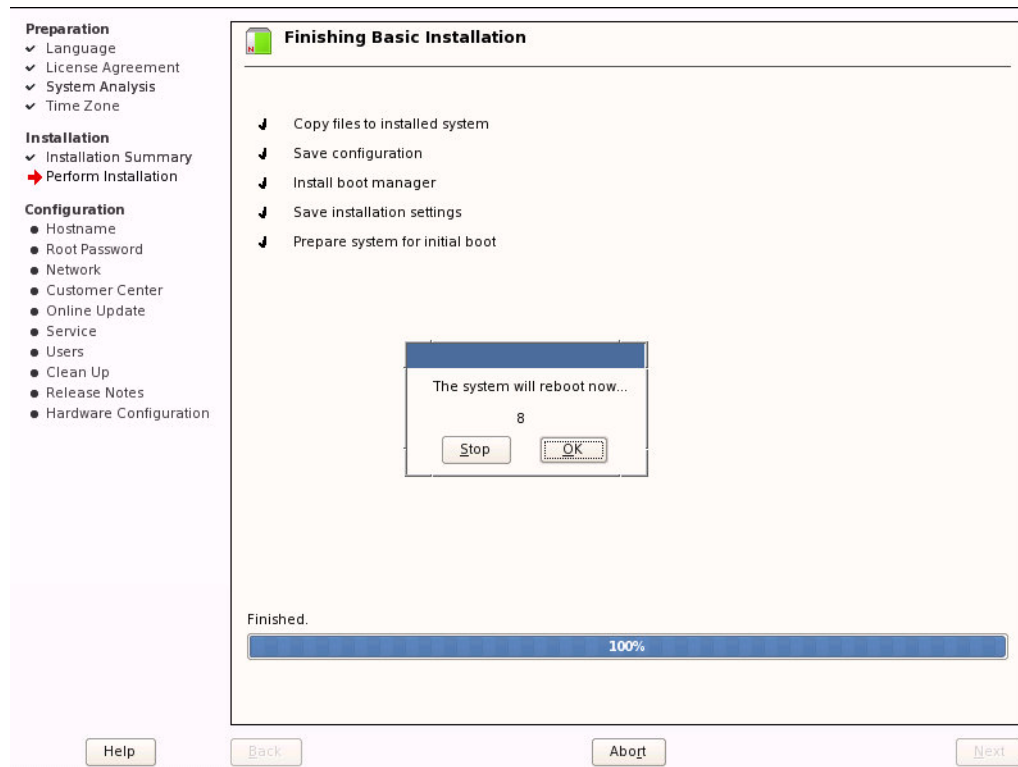
Step 14. If you wish to change additional settings, click the appropriate item and perform the changes, and click Accept when done.

Step 15. In the Confirm Installation window, click Install to start the installation. (See image below.)



Step 16. At the end of the file copying stage, the Finishing Basic Installation window will pop up and ask for confirming a reboot. You can click OK to skip count-down. (See image below.)

Note: Assuming that the machine has been correctly configured to boot from BoIB via its connection to the iSCSI target, make sure that gPXE has the highest priority in the BIOS boot sequence.



Step 17. Once the boot is complete, the Startup Options window will pop up. Select SUSE Linux Enterprise Server 10 then press Enter.



Step 18. The Hostname and Domain Name window will pop up. Continue configuring your machine until the operating system is up, then you can start running the machine in normal operation mode.

Step 19. (Optional) If you wish to have the second instance of connecting to the iSCSI Target go through the IB driver, copy the `initrd` file under `/boot` to a new location, add the IB driver into it after the load commands of the iSCSI Initiator modules, and continue as described in [Section 1.11 on page 10](#).

Warning! Pay extra care when changing `initrd` as any mistake may prevent the client machine from booting. It is recommended to have a back-up iSCSI Initiator on a machine other than the client you are working with, to allow for debug in case `initrd` gets corrupted.

In addition, edit the `init` file (that is in the `initrd` zip) and look for the following string

```
if [ "$iSCSI_TARGET_IPADDR" ] ; then
    iscsiserver="$iSCSI_TARGET_IPADDR"
fi
```

Now add before the string the following line:

```
iSCSI_TARGET_IPADDR=<IB IP Address of iSCSI Target>
```

Example:

```
iSCSI_TARGET_IPADDR=11.4.3.7
```

Revision History

Printed on April 10, 2008.

Rev 1.0 (08-April-2008)

- First release

